

Responses to EPA Questions on Output Based Allocation Methods

Submitted by Public Service Electric and Gas Company
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1. What are the sources of information that states need to determine and update allocations on a periodic basis?

Electric Generation

Where do plants measure electricity?

Gross generation is measured at each generator unit. In addition, plants selling power onto the grid measure net generation at the busbar leaving the plant. These net measurements are the basis for billing and payment in the industry and are transmitted to the ISO or grid operator for system management.

What supporting records are needed?

Quality assurance of megawatt meters should not be a great concern, since meters are already monitored closely and typically operate with less than 1% error (about 0.1%). A simple check of net MWe reporting accuracy, however, could be to examine electricity purchase and sales information at the corporate level, to verify that plant generation reported for allocation purposes, when added together, equaled the difference between wholesale sales and purchases for the company for the same period.

What are the advantages and disadvantages of measuring net MWe? gross MWe?

The advantage of using net generation is that it takes into account the efficiency of the generation facility's auxiliary power consumption (e.g., the generation facilities own electricity consumption), which provides incentive for efficiency at the facility. In addition, by netting out electricity consumption associated with operating pollution control equipment, an allocation based on net MWe captures the full cost of operating back-end pollution control equipment (which is already captured for other reduction strategies such as switching to natural gas) and therefore provides a correct economic signal for selecting the most efficient reduction strategies.

The disadvantage of net MWe, according to some is that it tends to penalize plants with back-end pollution control devices (we believe it simply sends a correct economic signal about the cost of using such devices versus other control options).

The advantage of using gross MWe is that it would allow for allocation on a unit basis (we do not believe unit allocation is preferable).

The disadvantage of gross MWe is that it does not provide incentive for efficient electricity use at the plant.

Does gross generation fail to account for a plant's power requirements whose efficiency could be improved?

Yes.

Can net generation be measured at the point of sale?

Not necessarily, because the point of sale may vary in a competitive market and, for this reason, should probably not play a role in emissions allocations. The point of delivery to the grid (net MWe measured at the busbar) is probably a better basis for allocating emissions to an individual facility.

Can all electric generating plants measure net generation at the same general location and with the same method?

Yes, they already do, except that there are small discrepancies in the internal accounting methodologies. These differences tend to result in only minor measurement differences (less than 1%) and the development of ISO's is leading to increased standardization.

How can EPA allocate based on generation measured at the plant level or the generator or turbine level, when EPA's allowance tracking system tracks at the unit (boiler or turbine) level and EPA's emissions tracking system tracks emissions and heat input at the unit and stack level?

Sounds complicated, but it doesn't need to be. EPA can simply allocate at the plant level based on net generation of the plant and aggregate its monitored emissions to the plant level for compliance verification. EPA may need to modify its allowance tracking system to track at the plant level to avoid unnecessary complication, but this system would need to be modified anyway to accommodate the different sources included in a SIP Call, or other emissions trading program for pollutants other than SO₂. Furthermore, aggregation to the plant level will reduce the number of sources that will need to be tracked, which should simplify the system.

Steam (Thermal) Output:

How is steam output measured? With what equipment? In what units?

Steam output is measured with pressure taps on pipes exiting steam boilers based on ASTM specifications. The equipment measures pressure, flow and temperature, which can be used to calculate Btu's of energy.

Where is steam output measured?

In the pipes exiting the boiler.

Mechanical Output:

Is mechanical output going to be a form of output by either industrial or electrical generating units?

Mechanical output will likely be a small portion of output.

2. *Equipment sources used to measure output*

Is standard equipment available to measure power output?

Yes, watt-hour meters are standard equipment for measuring electric output and are becoming increasingly standardized by ISO's.

Does the measurement equipment vary based upon the source of energy? (e.g., is electricity measured the same way in a hydroelectric plant and a coal-fired unit?)

Generally no, but metering equipment is built to handle different loads, depending on the size of the facility.

Does the measurement equipment vary based upon the unit type or the generator/turbine type?

No.

What standard methods exist for ensuring the accuracy of output monitoring equipment (e.g., ASME or IEEE standards)?

For instrument transformers: IEEE Standard No. 57.13; ANSI Standard No. C93.1

For meters: ANSI C12.16.

Do sources typically use those standards?

Yes.

What is the typical error found in output measurements? Is the error different for steam and for electricity?

Error for net electricity is typically less than 1% (more like 1/10%).

3. Comparing and converting heat input, steam output and electrical output

Should steam output be converted to electrical output? If so, which method should be used to convert steam energy to electrical power equivalent? If steam energy were not converted, how could emission limitations be treated for co-generators?

Steam output should be converted into electricity output to simplify the allocation procedure. The thermal value of steam output (enthalpy) can be measured in BTU's and directly converted into kilowatt-hour equivalents by multiplying by 0.0002928. However, an important policy question is whether steam should get 100% credit as being equivalent to electricity, or whether it should be given only partial credit since no technology exists to convert steam into electricity with greater than about 38% efficiency. EPA's NOx NSPS rule gave 50% credit for steam Btu's, stating that that was an appropriate level to support co-generation and consistent with a FERC methodology for defining the useful heat output of PURPA-qualifying co-generation facilities.

What assumptions should be made about the efficiency of conversion from steam output to electrical output?

As discussed above, this is a critical policy questions that does not have a definitive technical answer other than to say it should be in the range between 38% and 100%. Obviously, the higher the better for co-generators with lots of steam output and the lower the better for other sources without significant steam output.

If output data were not available directly, what would be appropriate assumptions to make about the efficiency of conversion from heat input to output?

Output data should be made available by any facilities wanting to participate in a trading program or subject to an output allocation. Facilities that do not provide output data should be restricted from participating in trading, and/or be penalized for not providing the necessary data by being required to assume low efficiencies for conversion, such as 10,500—12,000 btu/kwh or higher.

4. How do states receive output data for setting future allocation?

If allocations were to be based upon electrical generation only, can a state use EIA form 759 for whichever ozone seasons a state selects?

For purposes of allocating to sources within each state, states could use any year's data it saw fit without undermining the overall program since it would only change that states internal allocation. However, states should be encouraged to use the most recent data, that would best reflect the existing fleet and current level of output by different facilities.